ABSTRACT OF THE DISCLOSURE

A system and method of non-linear grid fitting and coordinate system mapping may employ data processing techniques for fitting a set of measured fiducial data to an ideal set of fiducials; the fiducials may be arranged in a known (*e.g.*, Cartesian grid) pattern on a substrate imaged by an imaging apparatus. Exemplary embodiments may model the non-linear transformation to and from imaged coordinates (*i.e.*, coordinates derived from acquired image data) and artifact coordinates on the fiducial plate (*i.e.*, actual coordinates of the fiducial relative to a reference point on the fiducial plate).